

PLCS and DEXs

Nigel Shaw
Eurostep Limited



Who am I?

- Nigel Shaw
 - Managing Director, Eurostep Limited
 - Director, Eurostep Group AB
- Technical Architect for ISO 10303-239
- Member OASIS PLCS Technical Oversight Group
- Background
 - Chair STEP Editing committee (1989-1993)
 - Chair ProSTEP Round Table for CAD (1995-1999)
 - Lead modeller - NATO Product Data Model

What is the Business problem?

Current Logistics information management:

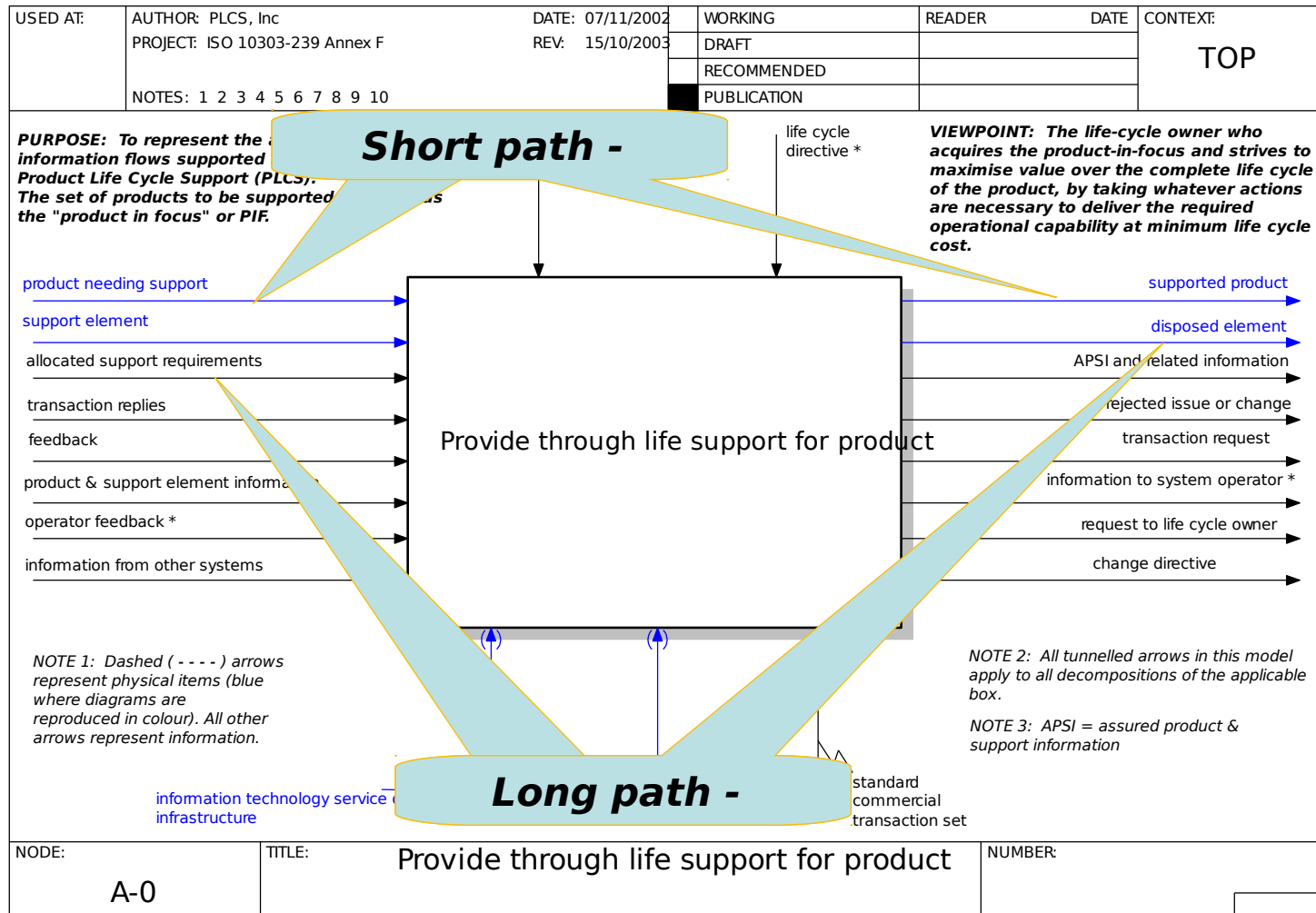
- Stove piped systems
- Stove piped standards
 - Acquisition biased – not through-life
- Inflexible with respect to changing processes
 - Different ways of doing business
- Inability to use feedback
 - To improve support processes
 - To improve designs in and across projects
- No audit/traceability

How does it relate to PBL?

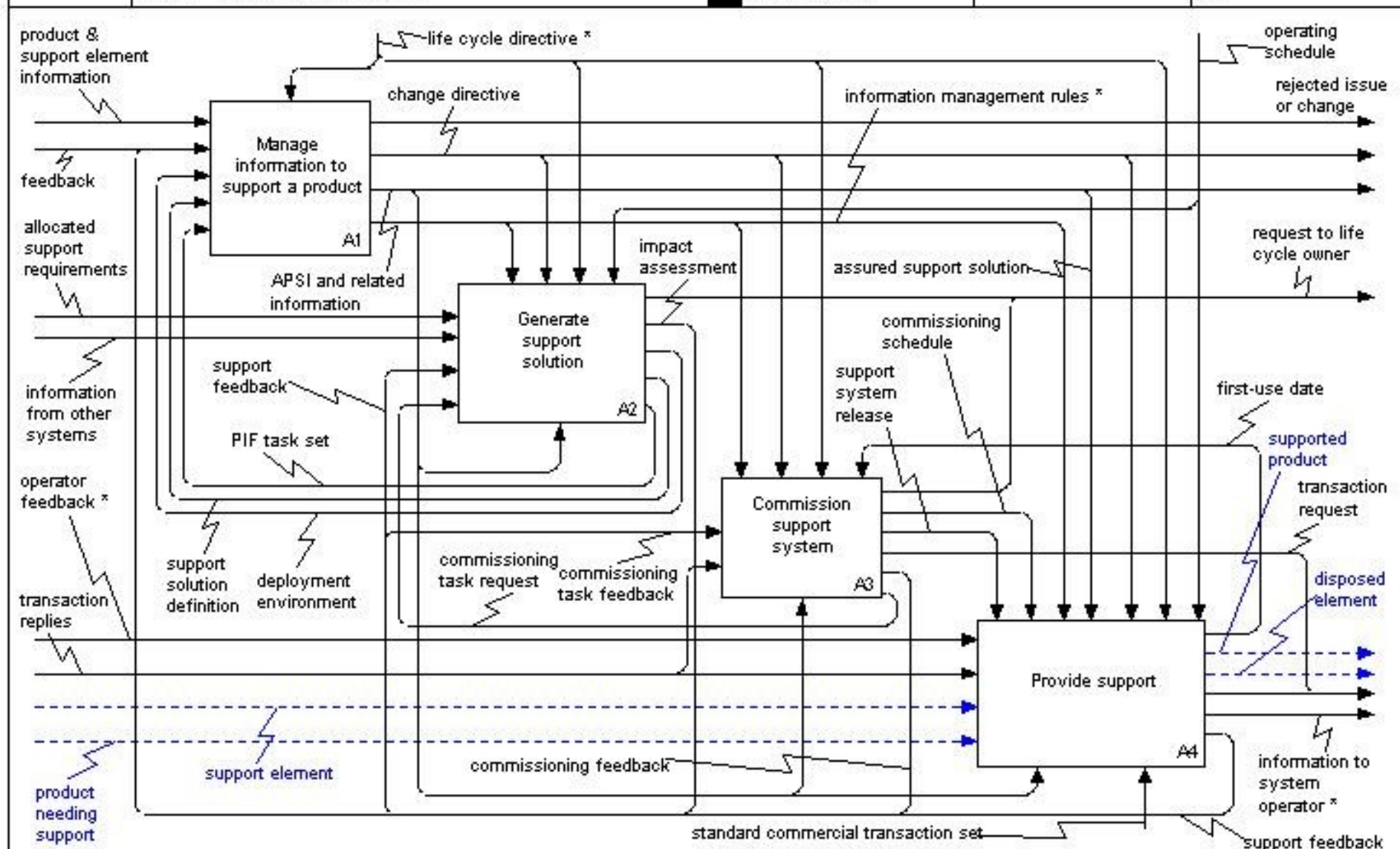
- **Industry** need accurate, up-to-date information to enable you to maximize your margin in successfully delivering against PBL contracts
- **Customers** need to contract for and receive consistent information to assess delivery and performance
 - And to carry over learning between projects

PBL = Performance Based Logistics = Support Options Matrix

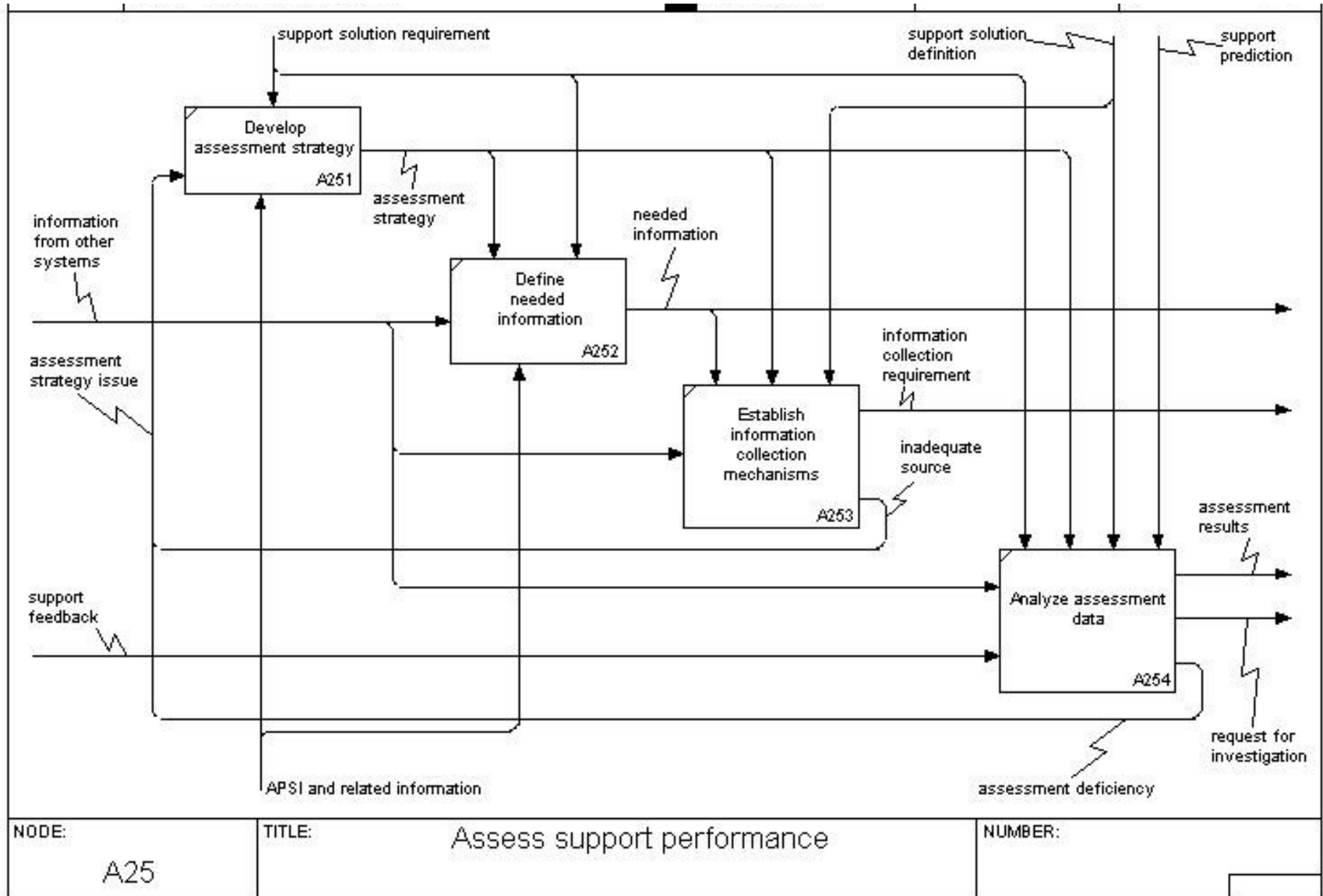
PLCS Activity Model



USED AT:	AUTHOR: PLCS, Inc	DATE: 30/10/2001	WORKING	READER	DATE	CONTEXT:
	PROJECT: ISO 10303-239 Annex F	REV: 22/09/2004	DRAFT			
			RECOMMENDED			
	NOTES: 1 2 3 4 5 6 7 8 9 10		PUBLICATION			A0



NODE: A0	TITLE: Provide through life support for product	NUMBER:
-------------	--	---------



does the contracted party involved in PBL demonstrate that they have satisfied the contract?
By agreeing on data to be collected that provides for contract audit.

What is the scope of PLCS?

- The key ideas
- Information scope

Product in focus



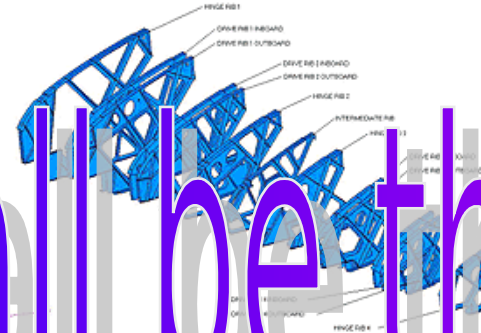
PLCS needed a term
to deal with the fact
that support and

A design

These can all be the
Product in focus



One individual product



A design as
will be used
an organization



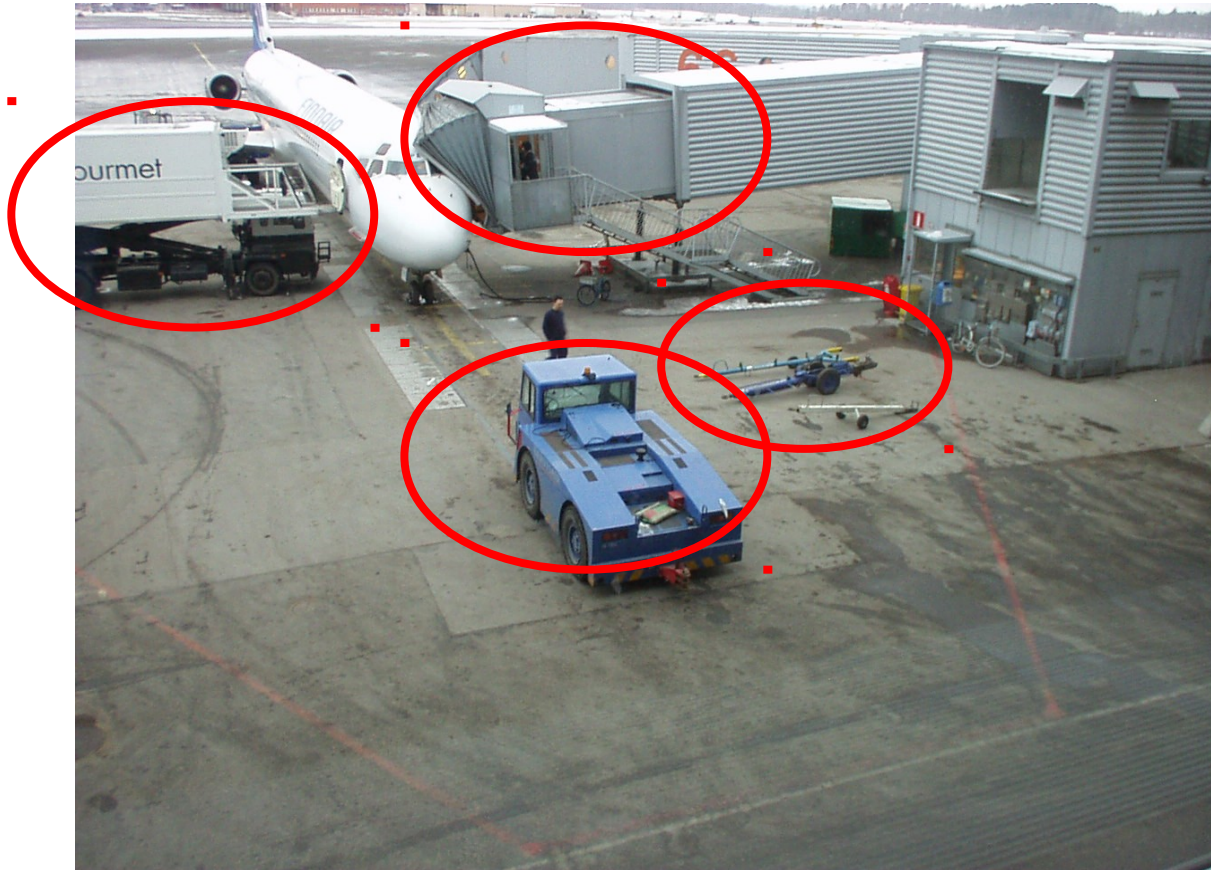
A fleet of
individual



A family of
design varian

Product in focus

- Can also be the support equipment



Assured Product Support Information (APSI)

- When you are about to undertake a maintenance task you need to know that:
 - It is the right task version for the product being maintained
 - That any additional information required is correct and up-to-date
 - That the product's configuration matches that for which the task is defined
 - ... etc.
- In other words: the correct information for the combination of job and product
 - As approved for use

APSI

- Enabling the creation and maintenance of a set of Assured Product and Support Information is a major reason for PLCS/AP239
- APSI includes the configuration history of the product(s) in focus
 - And a lot more

History versus Planning

Beyond APSI there is a lot more data

- Plans and schedules
- Records of work done
- Records of problem conditions

A key objective for PLCS is to enable comparison of what has been done with what was supposed to happen.

- Usage, failures, tasks, resources,...

History of Activities

As well as the APSI:

- What the product has been doing?
 - Significant events
- What tasks were planned and done?
 - What changes have been carried out?
- What tasks were not planned but were done anyway?
- What tasks were planned but not done?

History of states

- Alongside the activities need to know:
- Operational state history
 - Flew on one engine for 2 hours due to cracked fuel pipe
 - Cracked pipe replaced 4 hours after landing
 - Ran at full power for 2 days in extreme storm conditions

Reference data enables extensions to the AP239 information model

- The information model is prescriptive – but does not cover everything
- The model is extended by “Reference data”
- An agreed set of definitions used by one or more applications or projects within the life cycle of a product, to which reference needs to be made.
- Example:
 - Product categories
 - Fault states
 - Document types

How is PLCS using reference data?

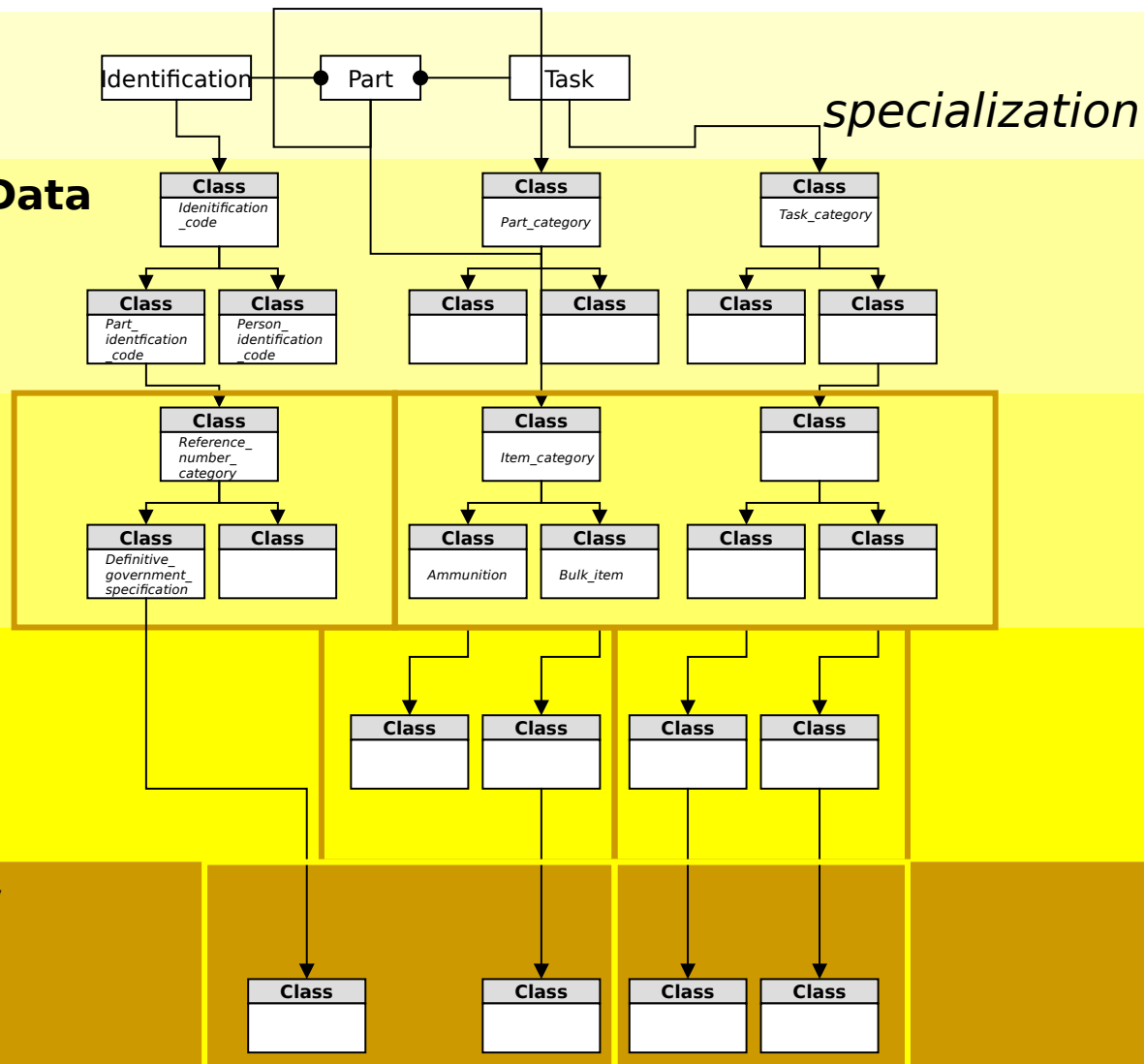
PLCS definitions
ISO 10303-239

OASIS Reference Data

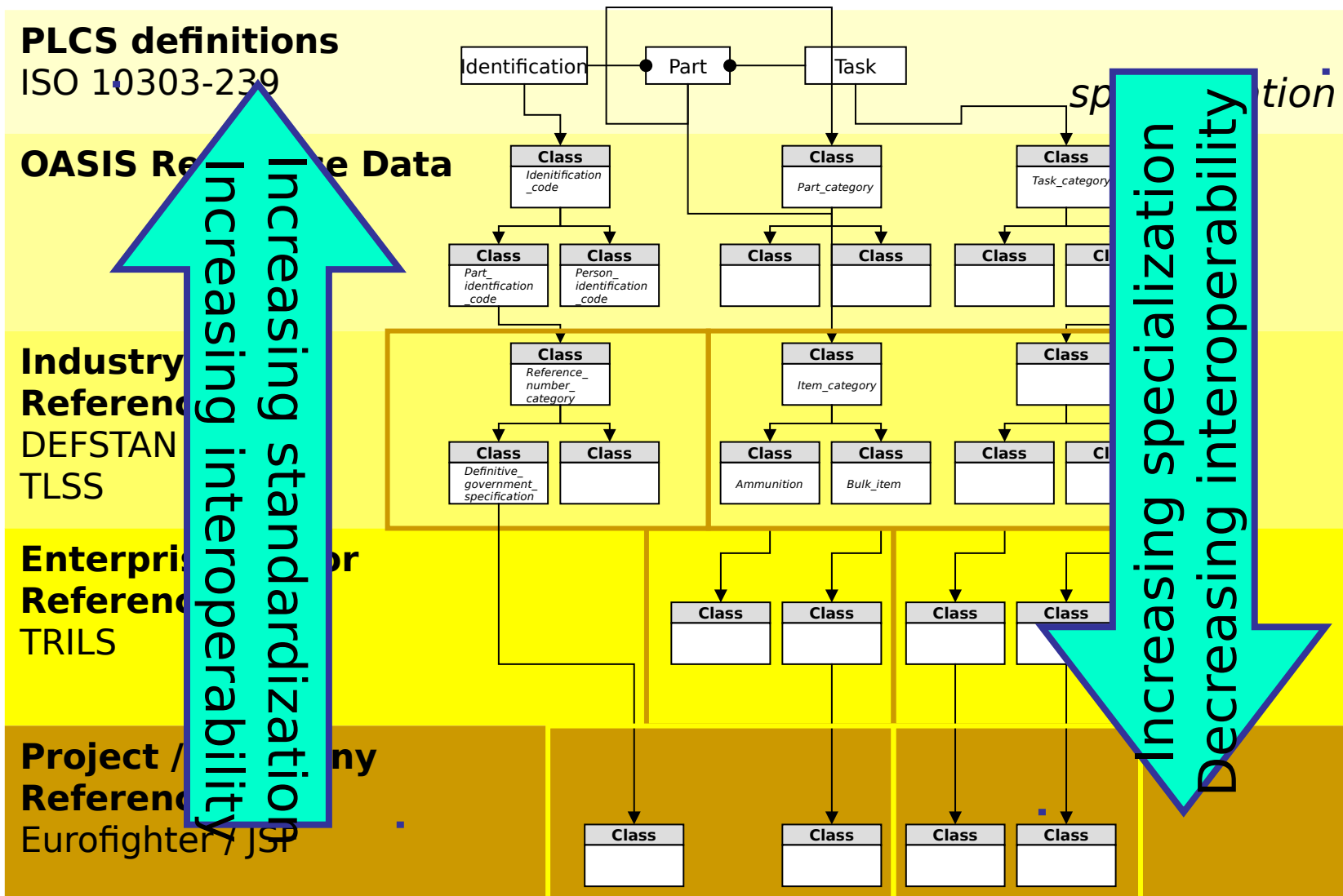
**Industry sector
Reference Data**
DEFSTAN 0060
TLSS

**Enterprise sector
Reference Data**
TRILS

**Project / Company
Reference Data**
Eurofighter / JSF



How is PLCS using reference data?



Model overview

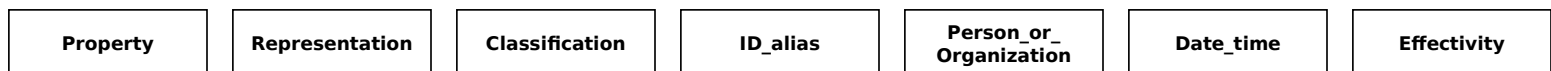
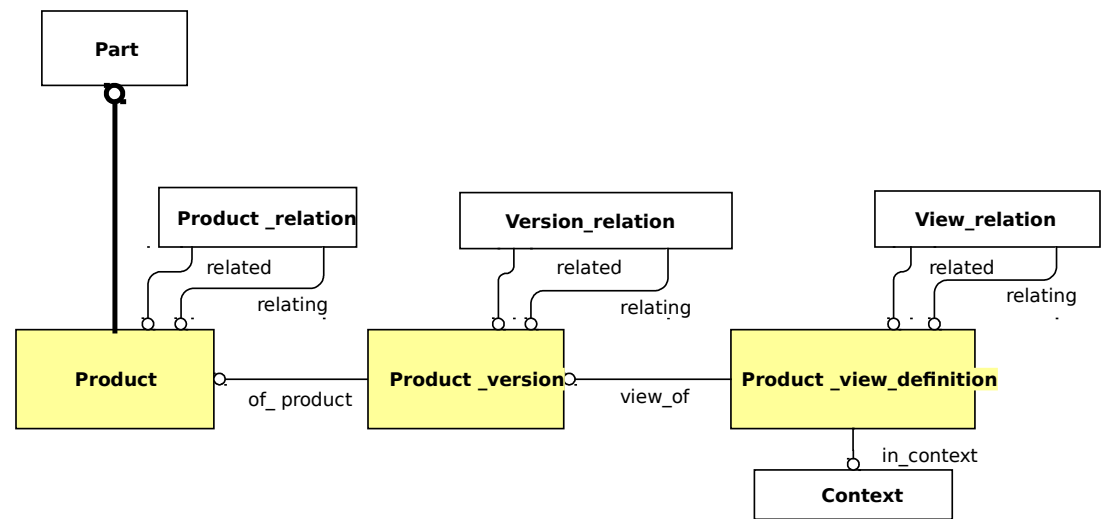
Information scope

- What follows is a high level abstract view of the scope showing key elements
 - From 10,000 feet!
 - And from 100 feet.

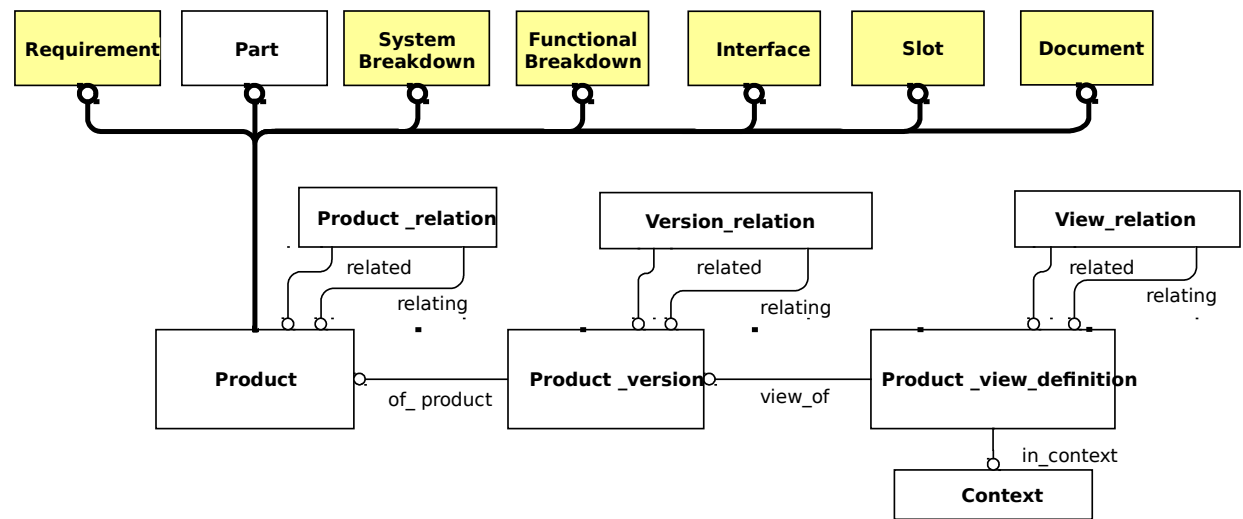
Product

Product structures

Assignments

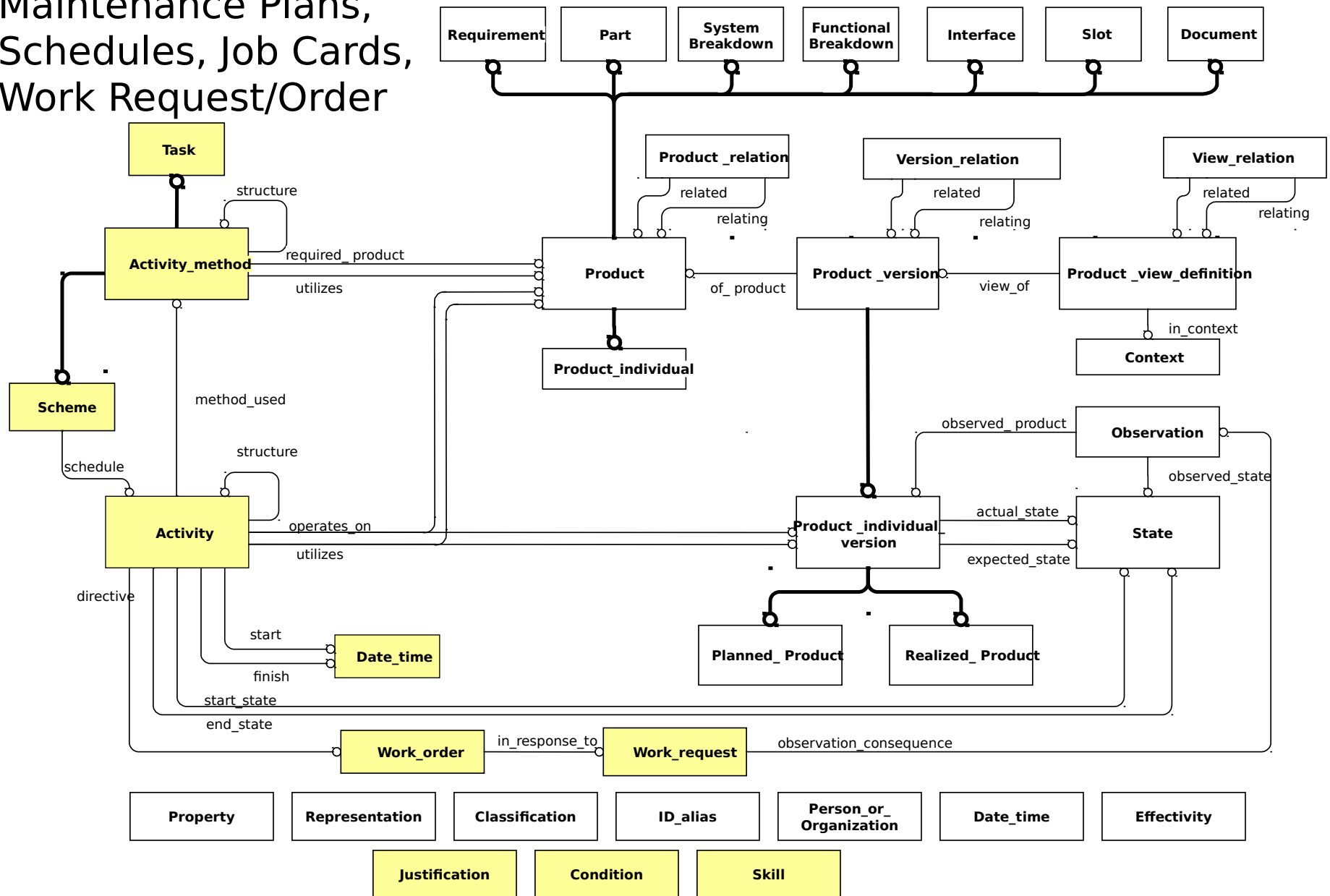


Types of Products



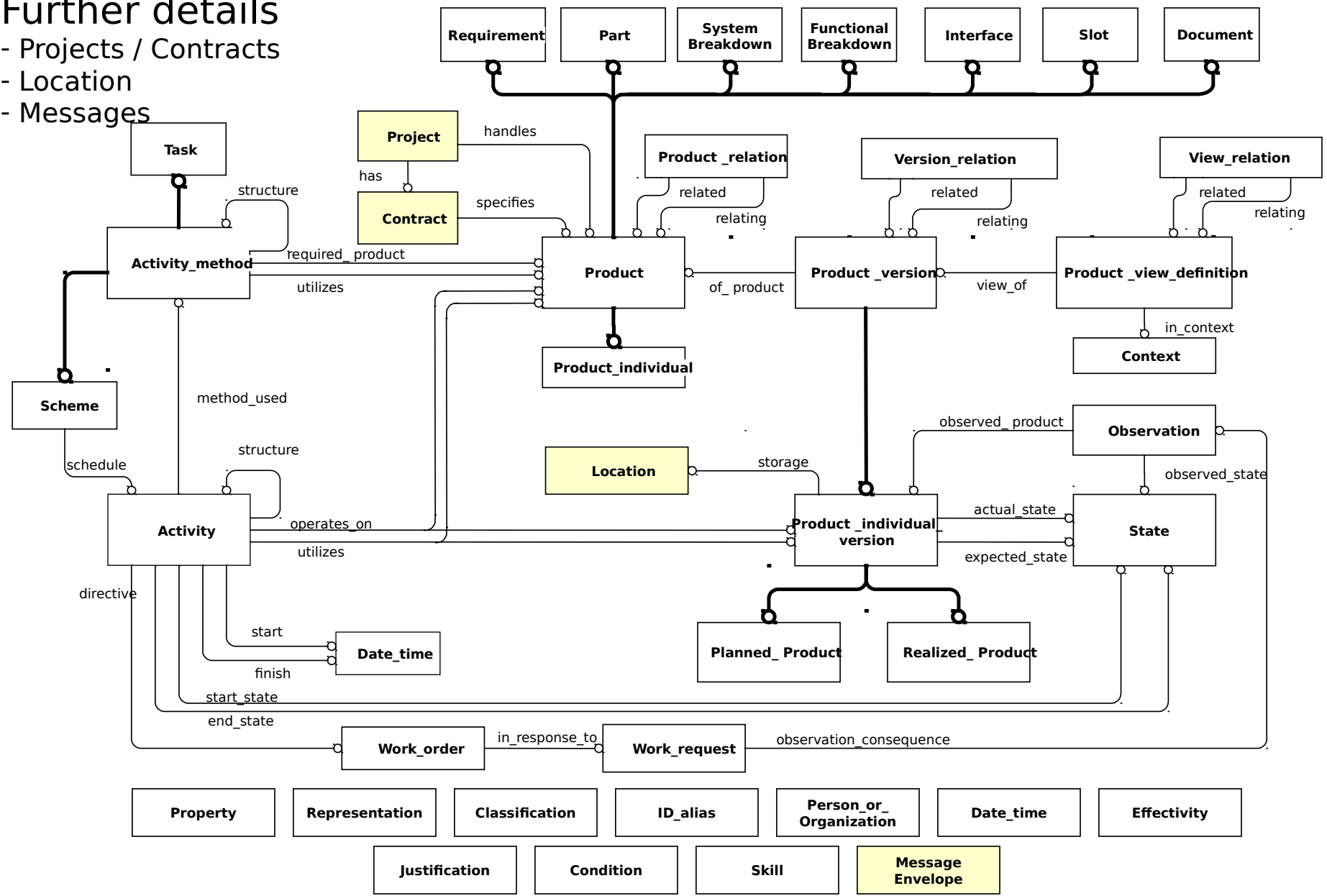


Maintenance Plans, Schedules, Job Cards, Work Request/Order

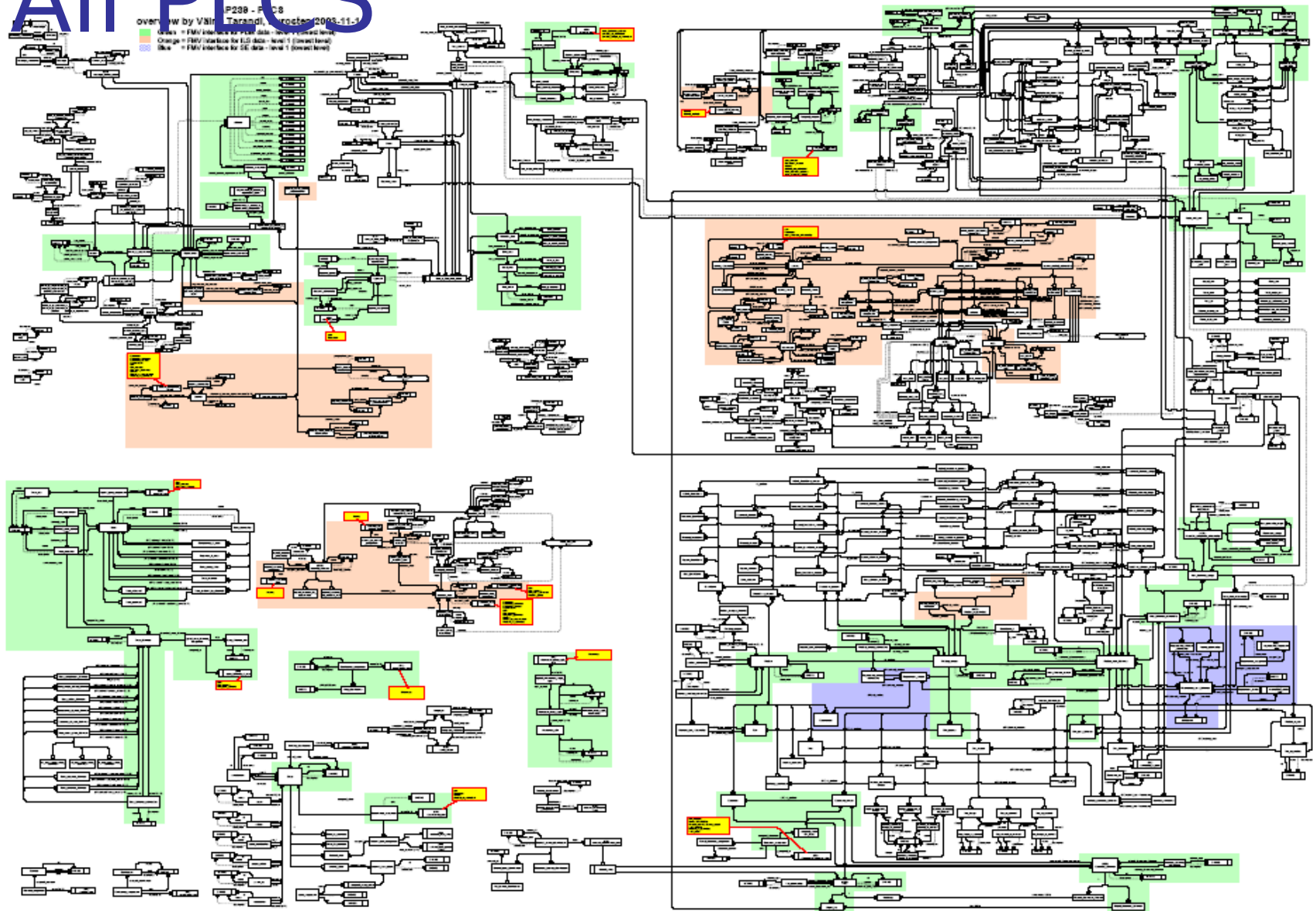


Further details

- Projects / Contracts
- Location
- Messages



All PLCs

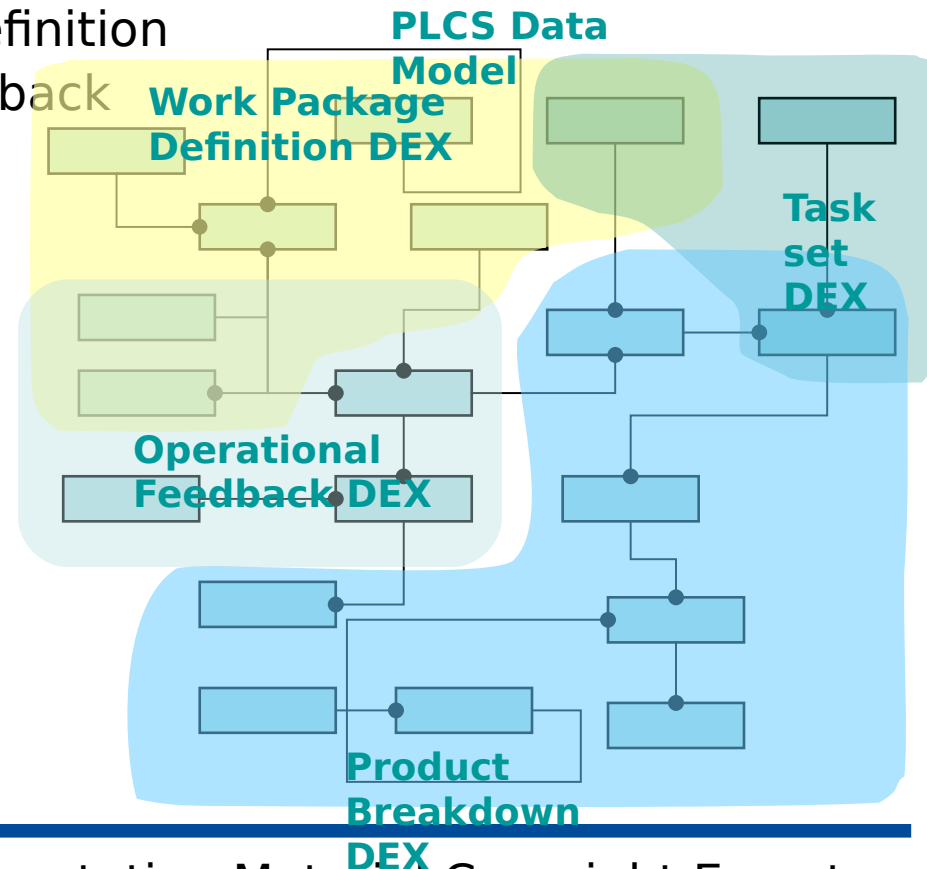


Why DEXs?

- Scope reduction
 - The model is too large for most exchange situations
- Specialization
 - The model is too generic for exchange without more detail
- User guidance
 - Ensure consistency
 - Minimise wasted effort
- Contracting
 - Need to specify what data
- Conformance
 - Need to be able to state conformance
 - Need achievable conformance

What is a DEX?

- A Data EXchange specification is mechanism for dividing up the PLCS information model into sections (DEXs) suited for a particular business process. E.g:
 - DEX: (D001) - Product Breakdown for support
 - DEX: (D004) - Work Package Definition
 - DEX: (D007) - Operational Feedback
- A DEX provides:
 - subset of the information model
 - a technical specification for implementers of PLCS
 - Adds Reference Data



Entities used by the DEXs

- System requirements N/A
- Product as Individual 200
- Fault_states 195
- Maintenance plan 218
- Product breakdown for support 162
- Aviation Maintenance 172
- Task set 235
- Work Package definition 233
- Work package report 191
- Operational feedback 275
- The whole PLCS data model 459

Note:
Provisional
Figures

PLCS usage

Production

- BAE Land Systems Hägglunds
 - Provision of configuration managed manufacturing data to suppliers
 - Provision of support data to customer for development of tech pubs
- Norwegian Defence
 - acquisition of new Frigate
- Swedish Defence
 - Product Configuration management
 - Task maintenance management
 - Spares Optimisation with audit
- UK Ministry of Defence
 - Work scheduling, operational feedback
 - Pilot implementation of translators to 9 MOD legacy systems with central view
- US Industry
 - synchronization of requirements between DOORS & Requisite Pro

Pilots

- Airbus
- ATA

Commercial implementations.

- A PLCS shared data repository is available as a COTS product

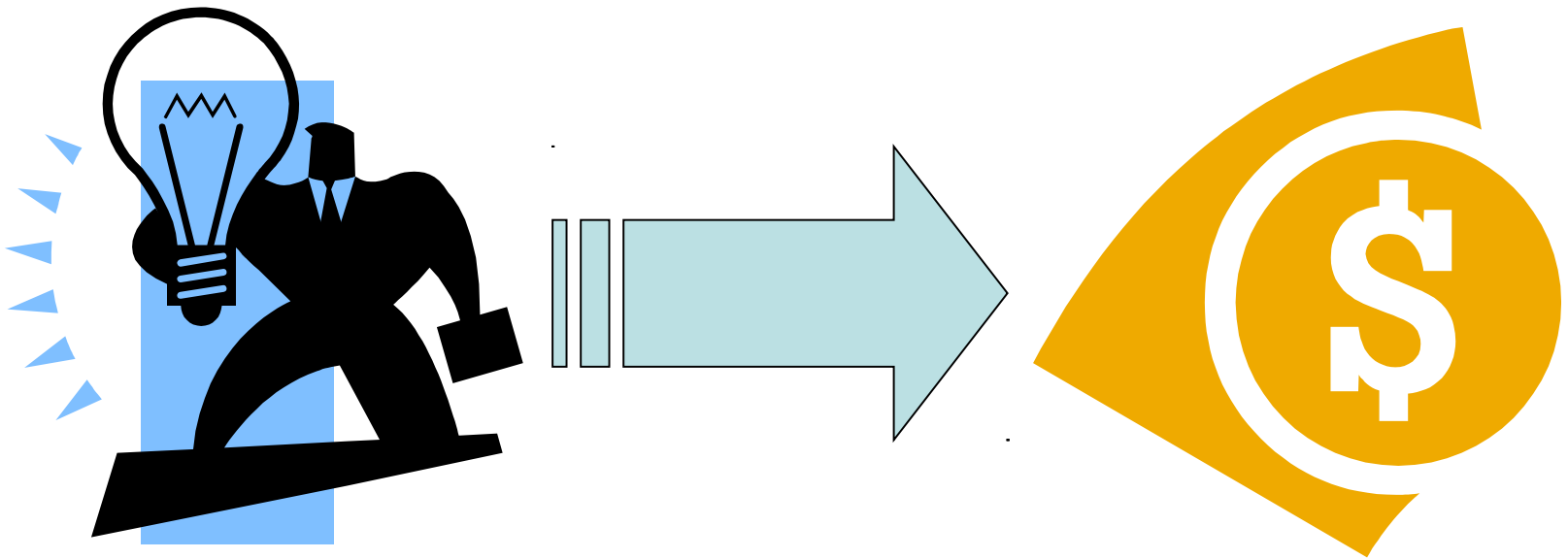
Why is PLCS model so big and flexible?

- To allow for through-life change to be captured
- To support audit and traceability
 - Who said, when, why
- To enable future as well as current approaches
- But ...
 - The complexity is optional
 - Need not be populated

How does PLCS relate to UID's?

- Simply:
 - Without good identification schemes cannot consolidate and relate information
 - So UID and PLCS are made for each other
- PLCS allows for multiple Id's with owners
 - UID is one! There is still likely to be more.
 - Have completed documentation of how PLCS handles all the AIA view of UIDs
- In an ideal world:
 - Consistent identification schemes for a lot more than just individual products

Exploiting PLCS



PLCS enables ...

- PLCS is not a solution or a system
- It is an enabler
- It facilitates
 - Re-use of translators in working with different target systems
 - Re-use of data across
 - Different system types
 - Multiple enterprises
 - Through time
- There has to be a business reason before using it

How good is your data?

- A warning: Using PLCS will expose data quality problems
 - During processor development
 - From varying system usage
 - In merging data sets from different sources
 - This is **NOT** a problem with the standard
 - Although some managers may see it that way
- Improved Data Quality can add immediate value

Ways to use PLCS

- To assist in understanding business process improvement opportunities or clarifying system requirements
- To define and implement interfaces
- As an integration model
 - Consolidation of information across the enterprise

The Big Picture

- PLCS has been designed to enable feedback and optimization across the Product Life Cycle
- This requires a data warehouse holding a comprehensive set of APSI and history data
 - May be distributed and could be virtual
 - Consolidation of information from many sources
- This requires feedback collection over long periods
 - With processes/automation in place to ensure rigor and accuracy
- Business return on investment may be long term
 - Improved products and processes, lower maintenance and higher reliability - Through Life ILS
- Short term gain from traceability and audit of data
 - Current processes are too anonymous and fail to deal with change

Headaches

- Where are the short term wins?
- Where is there pain in the current process?
 - Mandraulic or unreliable data transfer
 - Unreliable data leading to cost
 - Persistent data inconsistencies between systems or organizations
 - Managing individuals versus designs
 - Individual identification
 - UID
 - Problems with spare parts & resources
 - Problems with information availability
- Deal with a current problem and use PLCS

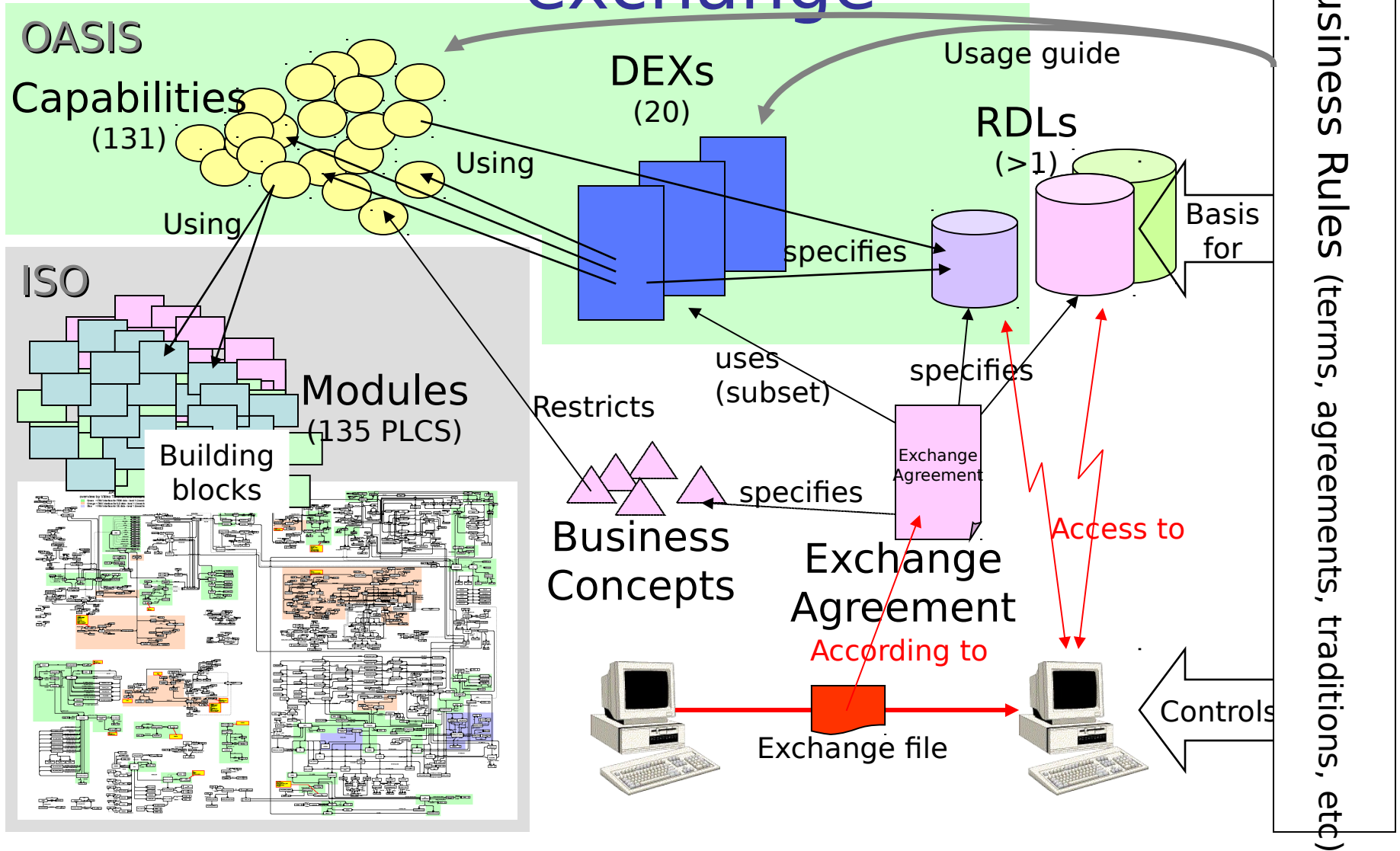
Contract

- Where
 - The success of a contract depends on two-way exchange of data between the parties
 - The data falls in the scope of PLCS
 - Direct systems integration is not an option
 - Firewalls and other security requirements
 - Business imperatives
 - Systems in use may change during the life of the contract
- PLCS can provide
 - Activity framework via the Activity Model
 - Data exchange
 - Collaboration basis and hub

Technology

- Modelling
 - EXPRESS is an early Model-Driven Architecture
 - IDEF0 is used for illustration – not process definition
- XML
 - The ISO 10303-28 XML is complex in order to cope with the generality
- Web-Services and SOA
 - Eurostep has defined and is using a set of PLCS web services
 - Will be submitting these to the OASIS PLCS TC

exchange



Questions

nigel.shaw@eurostep.com



Presented by

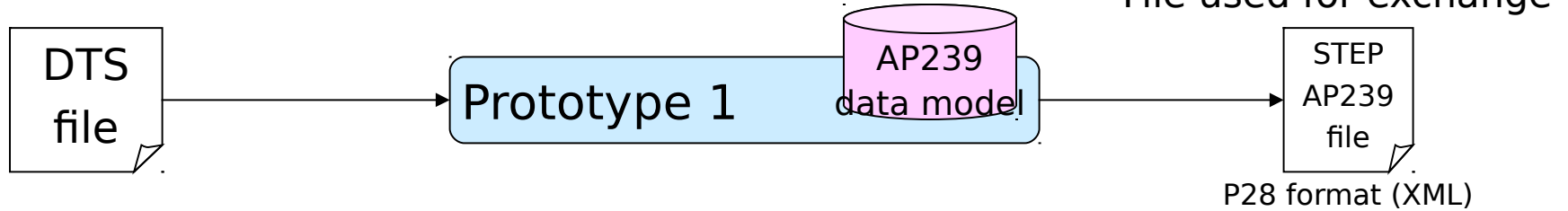
Frederic DARRE

System Engineering and PLCS at Airbus Overview

STEP AP239 and STEP AP233

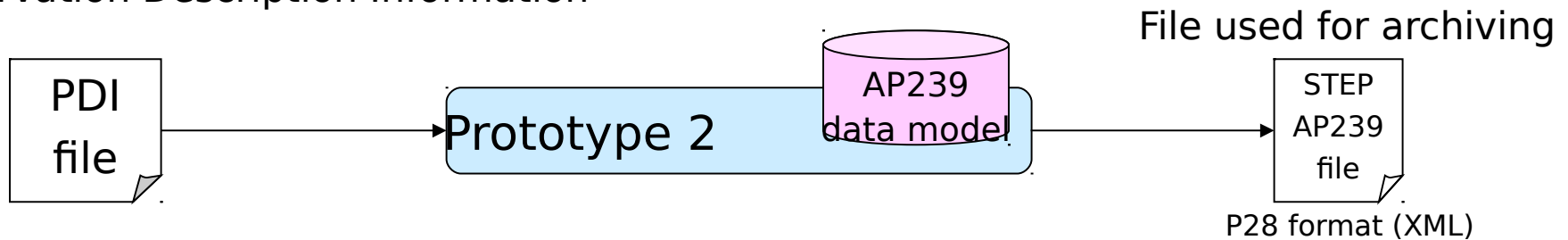
STEP AP239 Product Life Cycle Support

Data Transfer Sheet



- Replacement of the Airbus own format by the AP239 format

Preservation Description Information



- Creation of a data model in AP239 for the long term retention of the PDI (Airbus LTA project)

This two data models has to be validated internally and with the D

Following two slides

- Are taken from the kick-off of a current joint MOD/Industry project

Industry Objectives

- MOD and Industry objectives are the same:
 - A jointly agreed target architecture underpinned by agreed processes, standards and rule sets that set the foundation for the delivery of Logistics Information Systems capability across Defence
- Industry will benefit from:
 - Clear requirements that avoid the development of inconsistent, tactical, expensive, point-to-point, project specific solutions to meet collaborative business and operational information requirements
 - A share in the reduced costs in delivering modern support contracts
 - Accelerated opportunities for the delivery of the associated information requirements

The Logistic Information Systems Picture

What we need is:

Trusted end-to-end
information visibility and
exchange

Reduced time to delivery

Better value for money

Reduced integration risk

Cheaper and more
straightforward upgrades

Better, timely exploitation of
commercial research and
development

What we currently get is:

Different implementations of
the same basic components

Multiple user interfaces –
with a large training burden

Bespoke components that
isolate us from the natural
upgrade path

Payment many times over
for the same problems to be
solved